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1968-1969

STATE OF ALASKA
Keith H. Miller, Governor

ANNUAL REPORT OF PROGRESS, 1968 - 1969

FEDERAL AID IN FISH RESTORATION PROJECT F-9-1

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME
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INTRODUCTION

This report of progress involves the findings and work accomplished under the State of Alaska, Federal Aid in Fish Restoration, Project F-9-1, "Sport Fish Investigations of Alaska".

The work conducted during this reporting period constitutes effort on nine separate studies which are crucial in evaluating the sport fishing resources of the State. Recreational demands have necessitated broadening our knowledge of the fishery. All 20 jobs were of continuing nature enabling the Department to keep abreast of present and future impacts on certain fish species. Specifically, the work included work on inventory and cataloging of the sport fish and sport fish waters of the State, sport fishery creel census and access. Special emphasis was given to Dolly Varden, silver salmon, anadromous fish, grayling, salmon, sheefish, pike, and char. The information gathered has provided supporting documentation for better fish management and a basis for necessary future investigations.

The subject matter contained in these reports may be inconclusive. The findings and interpretation are subject to re-evaluation as the work progresses.

RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.

Project No: F-9-1 Title: Salmonid Rearing and Migration Study - Fire Lake and Ship Creek Systems.

Job No: 9-C-1

Period Covered: July 1, 1968 to June 30, 1969.

ABSTRACT

The Upper and Lower Fire Lake weirs were in operation from March 6 to October 27, 1968.

There were 12,558 salmonids of all species enumerated through the traps during the year. Fish were examined for marks and passed through the weirs in the direction of migration. Lengths, weights and scales were taken from samples of fish at intervals throughout the year.

Downstream migration of coho salmon smolts, Oncorhynchus kisutch, totaled 615 at Upper Fire Lake weir and 6,034 at Lower Fire Lake weir. Peak smolt migration occurred the week ending June 4 at Lower Fire Lake and the week ending June 11 at Upper Fire Lake. At the UFL weir, most of the smolts were marked and were predominantly age I. The predominant group at the LFL weir were age II unmarked smolts.

Small numbers of coho parr were observed at both UFL traps and the LFL downstream trap throughout the year. Substantial numbers of coho parr were captured in the LFL upstream trap, with the peak of migration recorded the week ending July 9 and continuing relatively high until September. During the first half of the trapping period, parr at LFL were largely age I. Substantial numbers of age 0 parr entered the trap during the last half of the trapping period.

Observed survival of 1965 brood-marked coho was 26.0 percent from Upper Fire Lake and 29.8 percent from Lower Fire Lake from time of planting to migration as age I and age II smolts combined.

Survival of the 1966 brood-marked coho was 10.9 percent from Upper Fire Lake and 16.4 percent from Lower Fire Lake from time of planting to migration as age I smolts.

Survival of various lots of coho smolts released below the UFL weir has ranged from 4.9 percent to 35.8 percent through the LFL weir.

There were 521 rainbow trout, Salmo gairdneri (Richardson), captured at both weirs. Thirty mature fish were captured, with 16 in the UFL upstream trap, 4 in the UFL downstream trap and 10 in the LFL downstream trap. Movement of juvenile rainbows was predominantly of fish moving upstream at the LFL weir.

Eight hundred eighty-seven Dolly Varden char, Salvelinus malma (Walbaum), were captured. The predominant group was juveniles moving upstream at the LFL weir, with peak movement observed during May.

Two marked king salmon, O. tshawytscha (Walbaum), from the 1966 plant were captured, one at the UFL downstream trap and the other in the LFL downstream trap.

Eight red salmon, O. nerka (Walbaum), smolts were captured; four at each of the downstream traps.

Two lots of rainbow trout, king salmon and coho salmon were reared at the Fort Richardson Cooling Pond during 1968. There were 340,000 fish of all species, weighing 21,303 pounds, planted from the pond during the year and 428,500 fish remained on hand December 31, 1968.

Two lots of rainbow trout and one lot of coho salmon were reared in the Elmendorf Air Force Base ponds during the year. Two thousand rainbows, which weighed a total of 400 pounds, and 15,000 coho, which weighed 73 pounds, were planted into lakes on Elmendorf Air Force Base.

An estimated 225,800 coho fingerlings were transferred to the Fort Richardson pond, and 5,300 rainbows remained on hand at the end of the calendar year.

RECOMMENDATIONS

1. That both Upper and Lower Fire Lakes be rehabilitated with rotenone during the summer of 1969.
2. That a weir be constructed in Lower Fire Creek to conduct a study of fish populations in the Creek as well as those in the lakes.
3. That the project segment relating to evaluation of the potential of rearing salmonids in heated water ponds be made separate.

OBJECTIVES

1. To investigate the rearing and migratory characteristics of various salmonid stocks in the Fire Lake system.
2. To determine the suitability of various stocks of fish in the Sport Fish Management program.
3. To evaluate the potential of artificially-heated ponds for rearing salmonids.

TECHNIQUES USED

The Upper and Lower Fire Lake weirs have been described in previous reports; this report is a continuation of the study reported by Gretz (1963 and 1964), Jones and Sexsmith (1965), Jones (1966), and Wallis (1967 and 1968).

Both the Upper and Lower Fire Lake weirs were operational during the period March 6 to October 27, 1968. Due to flooding of the creek, the UFL weir was removed for a few days in late May. The LFL weir was rendered inoperative by vandals and by flooding during a few days of the trapping period. Therefore, the data does not represent a complete capture of fish moving in the system throughout the year. Data suggests that there is very little movement of fish during the winter period. Unknown, but apparently substantial, numbers moved at some times when the traps were rendered inoperative.

Fish captured in the weirs were anesthetized with MS-222, examined for missing fins, and released in the direction of migration. Certain groups of fish, marked before release from the hatchery, were given an additional mark upon recapture. A complete list of fin marks used on fish in the

Fire Lake system was presented by Wallis (1968). Additional marks of specific interest during the current study period are listed under the pertinent headings in this report.

Selected samples of marked and unmarked fish were measured to the nearest millimeter fork length, weighed to the nearest 0.1 gram, and scales were removed for later examination. The method of selecting samples was as follows:

1. Sampling frequency: Marked juvenile silver salmon were sampled each day. Unmarked juvenile silvers were sampled two days per week during the period May 28 to June 18, then one day per week the remainder of the year.

   Rainbow, Dolly Varden and silver adults, and king and red salmon juveniles were sampled each day. Rainbow and Dolly Varden juveniles were sampled one day per week.

2. Length measurements: Less than 50 fish in a specific group - all were measured. Between 50 and 100 fish in a group - every other fish was measured. Between 100 and 250 fish in a group - every fifth fish was measured. Between 250 and 500 fish in a group - every 10th fish was measured. More than 500 fish in a group - every 20th fish was measured.

3. Weights and scale samples: Every tenth fish measured was weighed and scales were removed. Length data were grouped into five or ten-millimeter intervals. Data pertaining to time periods were grouped by the same weekly periods established in 1966 (Wallis, 1967).

Water temperatures were taken at both weirs with a maximum-minimum thermometer during the smolt migration period and at irregular times throughout the period the weirs were in operation.

FINDINGS

A total of 12,558 salmonids of all species was captured at the weirs during the investigational period.

Coho Salmon

There were 11,140 coho salmon, O. kisutch (Walbaum), captured at all traps during 1968 (Table 1), and were designated as parr, smolt or adult.

TABLE 1 - Number of Coho Salmon Trapped at the Upper and Lower Fire Lake Weirs by Weekly Periods with Parr, Smolt and Adult Designations, 1968.

	Upper Fire Lake Weir				Lower Fire Lake Weir				
	Upstream		Downstream		Upstream		Downstream		
Week Ending	Parr	Adult	Parr	Smolt	Parr	Smolt	Parr	Smolt	Adult
3/12	0	0	0	0	0	0	1	0	0
3/19	0	0	0	0	0	0	0	0	0
3/26	0	0	0	0	0	0	1	0	0
4/02	0	0	0	0	0	0	0	0	0
4/09	0	0	0	0	0	0	0	0	0
4/16	0	0	0	0	0	0	4	0	0
4/23	0	0	0	0	0	0	0	0	0
4/30	0	0	8	0	3	0	4	0	0

TABLE 1 (Cont.) - Number of Coho Salmon Trapped at the Upper and Lower Fire Lake Weirs by Weekly Periods with Parr, Smolt and Adult Designations, 1968.

Week Ending	Upper Fire Lake Weir				Lower Fire Lake Weir				
	Upstream		Downstream		Upstream		Downstream		
	Parr	Adult	Parr	Smolt	Parr	Smolt	Parr	Smolt	Adult
5/07	0	0	1	0	0	0	2	1	0
5/14	0	0	0	0	0	0	0	0	0
5/21	0	0	6	0	50	0	6	8	0
5/28	0	0	16	10	23	2	30	1,566	0
6/04	0	0	5	153	27	0	9	2,912	0
6/11	0	0	5	200	25	4	4	882	0
6/18	0	0	1	172	271	24	6	432	0
6/25	1	0	2	54	239	11	9	214	0
7/02	0	0	0	3	278	2	3	6	0
7/09	1	0	2	18	641	9	2	2	0
7/16	4	0	2	5	384	1	1	7	0
7/23	2	0	1	0	410	1	2	4	0
7/30	8	0	0	0	340	0	0	0	0
8/06	3	0	1	0	428	0	0	0	0
8/13	22	1*	4	0	455	0	3	0	0
8/20	30	0	5	0	161	0	6	0	0**
8/27	9	0	3	0	198	0	2	0	0
9/03	3	0	0	0	256	0	5	0	0
9/10	0	0	0	0	0	0	0	0	0
9/17	0	0	0	0	0	0	1	0	0
TOTAL	83	1	62	615	4,189	54	101	6,034	1
Dead or Killed	3	0	0	5	58	0	26	146	0
Number Released	80	1	62	610	4,131	54	75	5,888	1

*Freshwater adult, 189 mm.
**Freshwater adult, 181 mm.

Smolt Migration:

Downstream migration of coho smolts totaled 615 at the UFL weir and 6,034 at the LFL weir. The upstream movement at the LFL weir was less than one percent as great as the downstream movement. No marked smolts were observed in the upstream trap, although a minimum of 1,747 marked fish migrated downstream. There was no upstream smolt movement observed at the UFL weir.

Peak downstream movement of coho smolts at the LFL trap occurred during the week ending June 4 (Figure 1) with the peak day on May 31 when 966 fish were recorded. At the UFL weir the peak movement occurred during the week ending June 11 with the peak day on June 15 when 88 fish were captured. Peak movement at each weir has occurred during the same week for the past three consecutive years.

Samples of coho smolts were measured and size compositions of the smolt runs (one at Upper Fire Lake and one at Lower Fire Lake), weighted by sampling dates, are shown in Figure 2. At the UFL weir, most of the fish were marked and known to be ages I and II. The two age classes are identified by the separate modal groups, with age I fish predominating. While some groups of marked fish were present at the LFL weir, their

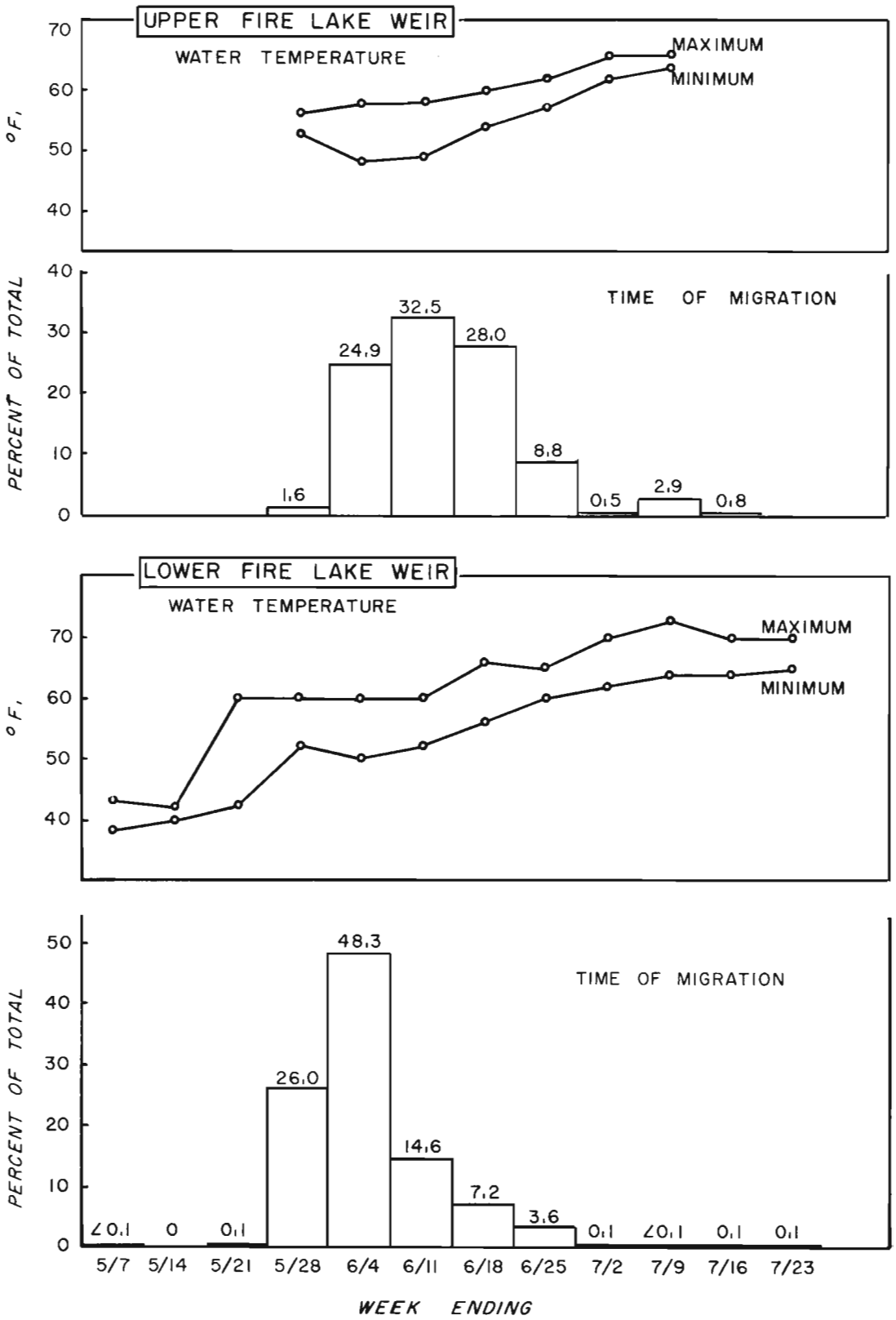

FIGURE 1. TIME OF COHO SALMON SMOLT MIGRATION FROM UPPER AND LOWER FIRE LAKES, AND WATER TEMPERATURES BY WEEKLY PERIODS, 1968.

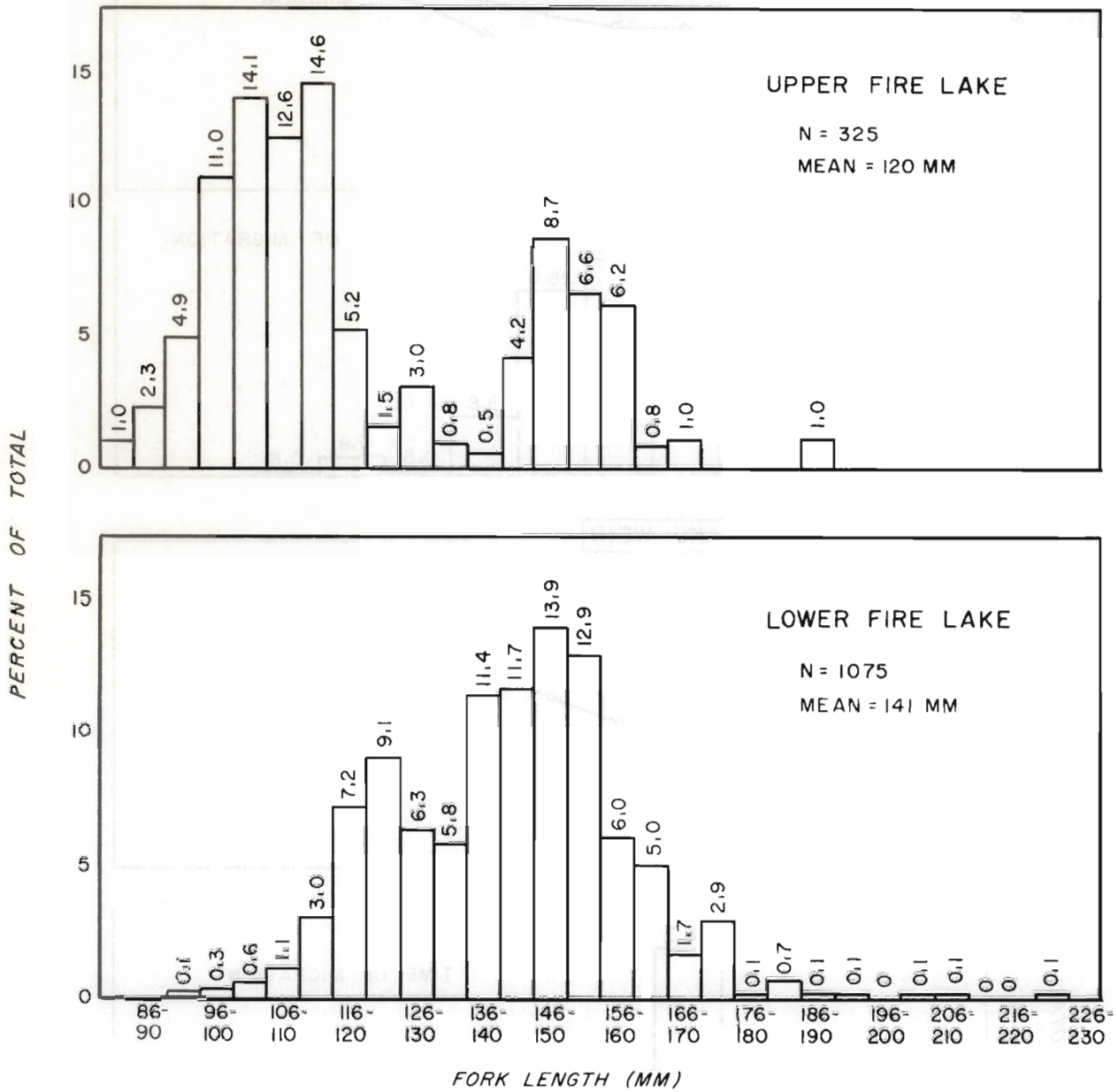

FIGURE 2. SIZE COMPOSITION OF COHO SMOLTS FROM UPPER AND LOWER FIRE LAKES, 1968.

identity by length is masked by unmarked fish, and it is not possible to assign definite age by length alone. Modal groups of 121 to 125 mm and 146 to 150 mm length intervals denote age I and age II smolts, respectively, with age II smolts predominating. A few marked age III smolts were present in the size range of 166 to 210 mm.

Parr Movements:

Parr movement at the UFL weir was relatively minor (Table 1). Peak upstream movement occurred in mid-August, while peak downstream movement was in late May, immediately preceding the smolt migration.

Small numbers of coho parr moved downstream at the LFL weir throughout the year, with the peak movement occurring the last week of May. Upstream movement at Lower Fire Lake peaked the week ending July 9, and remained relatively high until September.

Samples of coho parr were measured throughout the year, but due to small numbers of fish and inadequate samples, the length data at three of the traps was not meaningful. At the LFL upstream trap, there were large numbers of fish and an adequate sample was measured. The length composition of parr captured in the LFL upstream trap was separated into four 4-week periods as shown in Figure 3. Few scale samples of parr were taken, and a precise estimate of the age of the parr is not possible; however, estimates of age composition can be made based on length and previous years' scale analysis. During the first two 4-week periods, fish appear to have been largely age I. During the third period, there was an influx of fish of the year (age 0) denoted by the mode at the 61 to 65 mm length interval. Age 0 fish dominated the size composition during the last period, as indicated by the mode at the 71 to 75 mm interval (Wallis, 1967).

Adult Coho:

Two freshwater adult coho were observed. One in the UFL upstream trap was 189 mm fork length, and the one from the LFL downstream trap measured 181 mm.

Marked Coho:

Several groups of fin-marked coho were recovered at the weirs during 1968. A summary of fin-marked coho recovered at the weirs by mark and time period during 1968 is presented in Table 2. Several fish with marks of miscellaneous or uncertain origin and history were recovered and are indicated by footnote.

TABLE 2 - Numbers of Marked Coho Salmon Captured in the Upper and Lower Fire Lakes Downstream Traps by Weekly Periods During 1968.

	Upper Fire Lake Weir*			Lower Fire Lake Weir*					
Week Ending	RP** AdRM***	AdRV RM	RP Ad	AdRP --	AdRPRM --	LP Ad	AdRV RM	AdRVRM --	AdLV LM
3/12	0	0	0	0	0	0	0	0	1
3/19	0	0	0	0	0	0	0	0	0
3/26	0	0	0	0	0	0	0	0	1
4/02	0	0	0	0	0	0	0	0	0
4/09	0	0	0	0	0	0	0	0	0
4/16	0	0	0	0	0	0	0	0	4
4/23	0	0	0	0	0	0	0	0	0
4/30	0	0	0	0	0	0	0	0	3
5/07	0	0	0	0	0	0	0	0	1
5/14	0	0	0	0	0	0	0	0	0
5/21	0	1	0	0	0	0	0	0	5

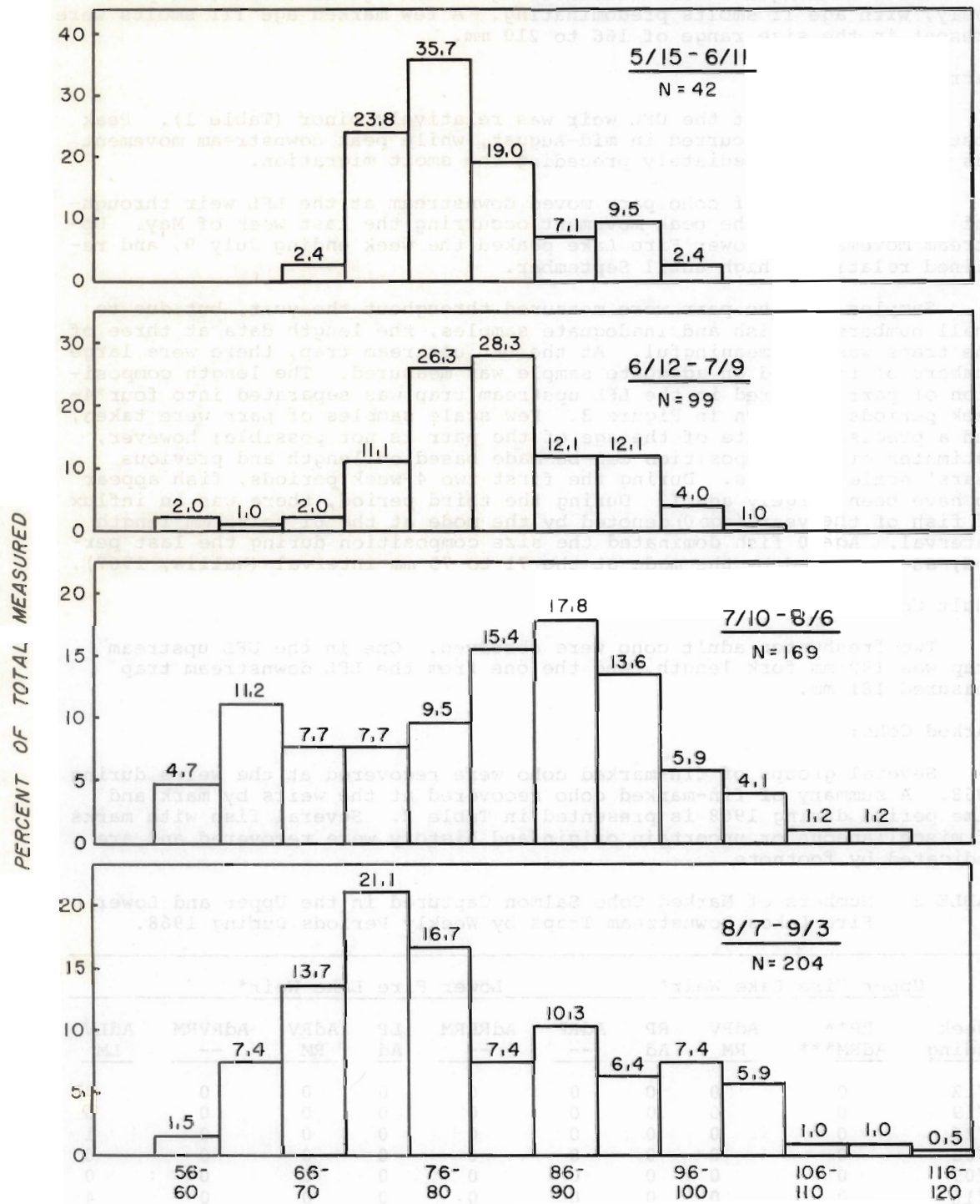

FIGURE 3. SIZE COMPOSITION OF COHO SALMON PARR AT LOWER FIRE LAKE UPSTREAM TRAP, BY 4-WEEK PERIODS, DURING 1968.

TABLE 2 (Cont.) - Numbers of Marked Coho Salmon Captured in the Upper and Lower Fire Lakes Downstream Traps by Weekly Periods During 1968.

	Upper Fire Lake Weir*				Lower Fire Lake Weir*				
Week Ending	RP** AdRM***	AdRV RM	RP Ad	AdRP --	AdRPRM --	LP Ad	AdRV RM	AdRVRM --	AdLV LM
5/28	2	8	7	13	0	51	0	0	47
6/04	34	69	8	13	0	29	4	0	514
6/11	35	116	15	6	11	4	10	0	464
6/18	18	121	12	0	13	0	16	8	301
6/25	1	50	2	0	3	0	16	16	152
7/02	0	1	0	0	0	0	1	1	1
7/09	0	19	0	0	1	0	0	0	2
7/16	0	4	1	0	0	0	0	2	3
7/23	0	0	0	0	0	0	1	0	1
7/30	0	0	0	0	0	0	0	0	0
8/06	0	0	0	0	0	0	0	0	0
8/13	0	0	0	0	0	0	0	0	0
8/20	0	0	0	0	0	0	0	0	1
TOTAL	90	389	45	32	28	84	48	27	1,501
Dead or Killed	2	1	0	0	0	0	0	0	45
Number Released	88	388	45	32	28	84	48	27	1,456

*Miscellaneous marks at capture (UFL weir): 7 - Ad; 9 - AdLV.
Miscellaneous marks at capture (LFL weir): 4 - AdLP; 4 - AdLVLM; 1 - AdBV; 1 - BV; 1 - BP; 13 - Ad; 2 - RV; 1 - LV

**This line indicates marks on fish at capture.

***This line indicates marks added to fish after capture.

A summary of planting and recovery data for groups of 1964, 1965 and 1966 brood coho marked and planted into Upper and Lower Fire Lakes is presented in Table 3.

Survival of Coho Smolts Between UFL and LFL Weirs:

In 1966, only 31.3 percent of the marked fish released below the UFL weir were observed leaving Lower Fire Lake. It was not possible to determine how many of the marked fish captured at the LFL weir had passed the UFL weir unobserved. In 1967 and 1968, all marked fish released below the UFL weir were given an additional mark to identify fish which had been captured and to index the year they passed the UFL weir. In 1967 and 1968, a substantial loss of smolts released below the UFL weir and not recovered at the LFL weir has been noted (Table 4).

A relatively small percentage of the age I smolts, which do not leave Lower Fire Lake the same year they enter, migrate as age II smolts the following year. Whether the fish which are not accounted for die or survive as land-locked fish is not known; however, preliminary examination of the data suggests that mortality may be high. For the 1964 brood, 17.8 percent of the age II immigrants into Lower Fire Lake emigrated the same year, but of the age I immigrants which did not emigrate the year they entered the lake, only 6.5 percent emigrated the following year as age II

TABLE 3 - Planting and Recovery Data for 1964, 1965 and 1966 Brood Coho Salmon Planted into Upper and Lower Fire Lakes.

Planting Data						Recovery Data*						
							Age				Total	
Brood	Lake	Number	Date	Average Size	Mark	Weir	0	I	II	III	Number	Percent
1964	UFL	2,000	8/65	--	LV	UFL**	-	1,064	50	-	1,114	55.7
1964	LFL	2,000	8/65	--	RV	LFL	-	609	39	2	650	32.5
1965	UFL	2,000	8/66	233/#	RP	UFL	2	367	90	-	459	23.0
						LFL***	-	15	45	-	60	3.0
						Total	2	382	135	-	519	26.0
1965	LFL	2,000	8/66	224/#	LP	LFL	25	483	88	-	596	29.8
1966	UFL	5,500	8/67	153/#	AdRV	UFL	160	389	--	-	549	10.0
						LFL***	--	48	--	-	48	0.9
						Total	160	437	--	-	597	10.9
1966	LFL	11,500	8/67	156/#	AdLV	LFL	385	1,505	--	-	1,890	16.4

*Numbers to the first weir of recapture.

**Additional numbers may have passed the UFL weir while it was not in operation, but there was no means of identifying such fish.

***These represent fish which passed the UFL weir without being captured and are therefore added to the total captured at the UFL weir.

smolts. For the 1965 brood, 31.8 percent of the age II immigrants continued through Lower Fire Lake the same year, whereas 10.6 percent of the hold-over age I immigrants migrated from the lake at age II.

TABLE 4 - Numbers of Marked Coho Salmon Released Below the Upper Fire Lake Weir and Numbers Recaptured at the Lower Fire Lake Weir, 1966 to 1968.

Fish Released Below UFL Weir				Fish Recaptured at LFL Weir					
				Age I		Age II		Total	
Brood	Year	Age	Number	No.	Percent	No.	Percent	No.	Percent
1964	1966*	I	986	309	31.3	44	6.5**	353	35.8
1964	1967	II	45	-	-	8	17.8	8	17.8
1965	1967	I	354	54	15.3	32	10.6**	86	24.3
1965	1968	II	88	-	-	28	31.8	28	31.8
1966	1968	I	547	27	4.9	-	-	27	4.9

*Age I fish of 1966 brood captured at LFL weir may have included some which were not enumerated at UFL weir.

**Percent = $\frac{\text{Age II emigrants}}{\text{Age I immigrants - Age I emigrants}}$ X 100

The coho smolt migration from Upper Fire Lake has been later than the migration from Lower Fire Lake. If environmental conditions play a role in determining time of emigration from these lakes, the Upper Fire Lake smolts may enter Lower Fire Lake after optimal environmental conditions have passed. Fish may encounter additional delay in locating the outlet of Lower Fire Lake.

Growth of Marked Coho:

Size compositions of different lots of marked coho smolts captured at the UFL and LFL weirs during 1968 are shown in Figure 4. Both age I and II smolts from Lower Fire Lake were larger than their counterparts from Upper Fire Lake. Age II smolts which spent their first year in Upper Fire Lake and their second in Lower Fire Lake were larger than age II smolts from Upper Fire Lake and comparable in size to those which spent two years in Lower Fire Lake.

Rainbow Trout

A total of 521 rainbow trout, S. gairdneri (Richardson), were enumerated at both weirs during 1968 (Table 5).

At the UFL weir, 13 mature males and three females were captured in the upstream trap between May 16 and May 27 and ranged in length from 204 to 485 mm with a mean of 259 mm. Four adults were captured in the downstream trap during the summer.

Ten mature adult rainbows, consisting of three males and seven females, were captured in the LFL downstream trap between May 21 and June 4. These fish ranged in length from 204 to 350 mm and averaged 288 mm. Four adults were recorded in the upstream trap. Apparently, the majority of adult spawners do not return to either weir while they are in operation. At the LFL weir, this means they do not return at all.

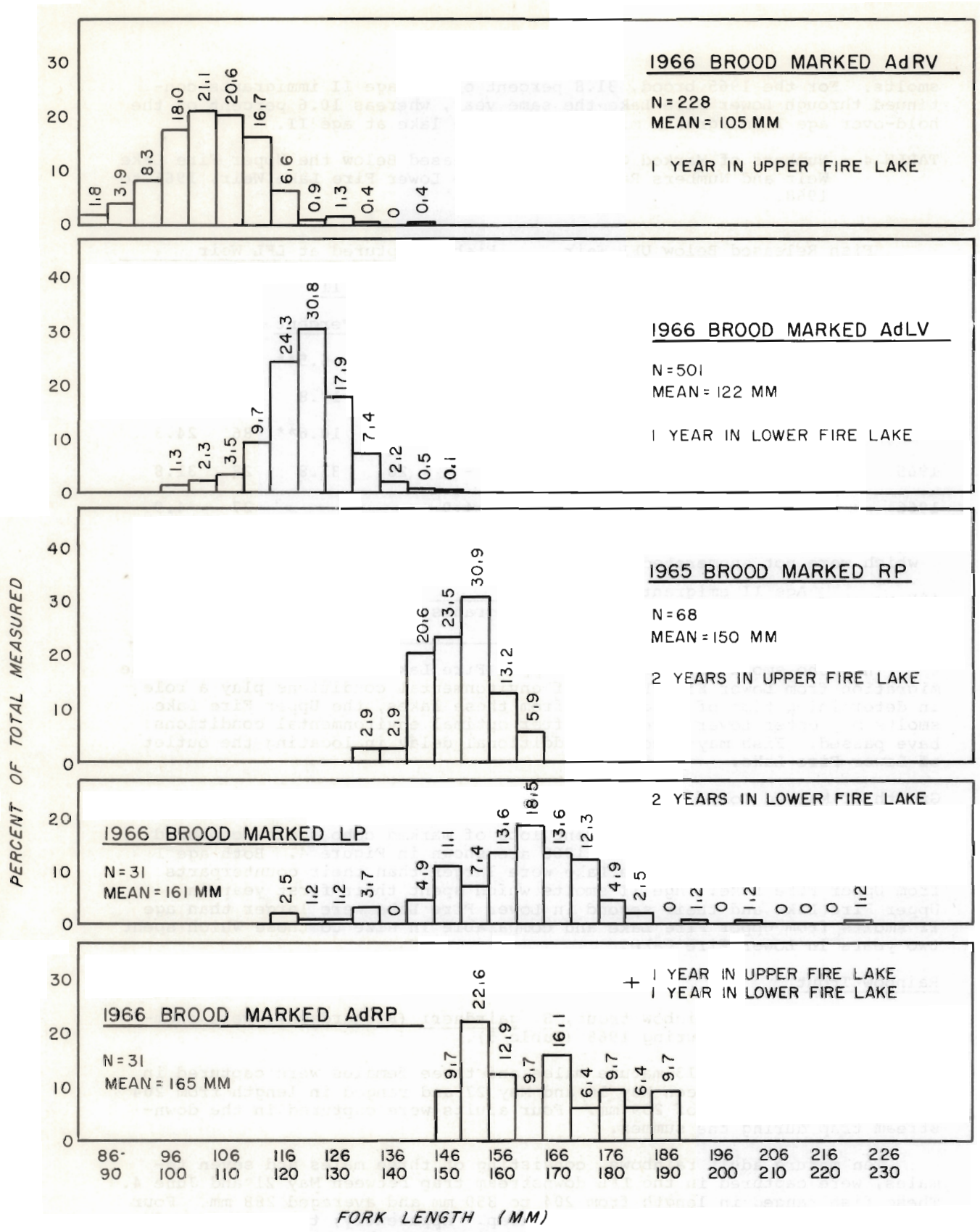

FIGURE 4. SIZE COMPOSITION OF MARKED COHO SMOLTS AT UPPER AND LOWER FIRE LAKE WEIRS, 1968.

TABLE 5 - Numbers of Rainbow Trout and Dolly Varden Char Trapped at Upper and Lower Fire Lake Weirs by Weekly Periods During 1968.

Week Ending	Upper Fire Lake Weir				Lower Fire Lake Weir			
	Upstream		Downstream		Upstream		Downstream	
	RB	DV	RB	DV	RB	DV	RB	DV
3/26	0	0	0	0	0	0	1	0
4/02	0	0	0	0	0	0	0	0
4/09	0	0	0	0	0	0	0	0
4/16	0	0	0	0	0	0	3	0
4/23	0	0	0	0	0	0	1	0
4/30	0	0	2	1	0	2	0	0
5/07	0	0	0	0	0	0	0	0
5/14	0	0	0	0	0	0	0	0
5/21	12	0	2	0	9	36	5	0
5/28	5	0	0	0	25	122	7	23
6/04	0	1	0	0	37	85	11	31
6/11	0	0	2	0	18	56	1	27
6/18	0	1	1	1	6	98	0	10
6/25	1	4	2	0	31	91	1	15
7/02	1	1	1	0	11	65	0	2
7/09	2	9	1	0	34	39	0	3
7/16	3	5	2	5	8	21	0	3
7/23	2	6	3	2	5	14	0	3
7/30	4	14	1	2	10	3	0	1
8/06	2	6	4	1	5	12	0	3
8/13	0	3	5	0	14	1	0	0
8/20	8	2	0	0	6	0	1	6
8/27	2	3	0	1	8	3	2	0
9/03	0	0	0	0	10	5	0	5
9/10	0	0	0	0	136	18	3	2
9/17	0	0	0	0	31	4	4	6
9/24	0	0	0	0	0	0	0	0
10/1	0	0	0	0	7	2	1	2
TOTAL	42	55	26	13	411	677	41	142
Dead or Killed	0	0	0	0	3	9	4	2
Number Released	42	55	26	13	408	668	37	140

The upstream movement of rainbow trout at the LFL weir began in mid-May and continued through the season with peaks in early June and September. Juvenile fish ranged in size from 70 to 170 mm and exhibited a gradual increase in size as the season progressed. The mean length for juveniles increased from 102 mm in the first half of the season (May 2 to July 9) to 126 mm in the second half (July 10 to September 3).

Dolly Varden Char

Eight hundred eighty-seven Dolly Varden, S. Malma (Walbaum), were tallied at both weirs in 1968 (Table 5).

A small upstream movement at the UFL weir began in July and ended in late August with the appearance of a few mature adults. Very few Dolly Varden were observed to move downstream at this weir.

A moderate downstream movement was recorded at the LFL weir, commmencing the last week of May with the peak the week ending June 4. This movement, concurrent with the coho smolt migration, was comprised of fish ranging from 108 to 248 mm and averaging 162 mm in length. Few mature adults were observed at the LFL weir.

An upstream movement of juvenile Dolly Varden was observed at the LFL weir from mid-May through the first week of August, with the peak occurring in the week of May 28. Lengths of juveniles ranged from 67 to 185 mm with a mean of 106 mm.

Miscellaneous Species

Two king salmon, O. tshawytscha (Walbaum), from the 1965 brood planted into Upper and Lower Fire Lakes were recovered in 1968. On May 28, one smolt was captured, marked by removal of the left maxillary and passed through the LFL weir. A king salmon 230 mm in length was found dead in the UFL downstream trap on June 7.

Eight unmarked red salmon, O. nerka (Walbaum), were captured at both weirs in 1968. Four downstream migrants were observed at the UFL weir from June 2 to June 8, and four were counted at the LFL weir between May 21 and June 5.

Fort Richardson Ponds

A production summary for 1966 brood coho, 1967 brood king salmon and 1967 brood rainbows reared in the Fort Richardson Cooling Pond is presented in Table 6. Average individual weight of fish of the same lots by time period is depicted in Figure 5.

TABLE 6 - Production Summary for 1966 Brood Coho, 1967 Brood King Salmon and 1967 Brood Rainbow Trout Reared at Fort Richardson Cooling Pond.

	1966 Coho	1967 Kings	1967 Rainbows
Date Pond Stocked	7/17, 8/31/67	11/29/67	10/2/67
Initial Number	229,400	113,700	45,300
Total Recorded Loss	3,600	6,700	4,600
Total Unaccounted Loss	13,900	24,600	21,000
Total Loss	17,500(7.6%)	31,300(27.5%)	25,600(56.5%)
Total Number Planted	211,900	82,400	19,700
Total Weight Planted	9,342 pounds	2,864 pounds	8,817 pounds
Total Fish Weight Gain	8/715 pounds	2,770 pounds	8,554 pounds
Total Pounds Food Fed	17,095 pounds	15,285 pounds	31,725 pounds
Food Conversion	2.0	5.5	3.7

Coho salmon of 1967 brood Oregon stock were transferred to the Fort Richardson Pond from Elmendorf on July 22. There were 225,800 fish, at an average size of 205 per pound, put into the pond; 26,000 at 93 per pound were planted into Johnson Lake (Soldotna) on August 28; and 198,900 at an average size of 28 per pound remained in the pond at the end of the calendar year.

There were 121,700 king salmon of Ship Creek origin that started feeding at Fort Richardson on October 21 to 25. At the end of the year, 118,900 fingerlings at 200 per pound remained on hand.

There were 698,700 rainbow fingerlings transferred to the Cooling Pond during August, and 530,800 fish were shipped and planted from the

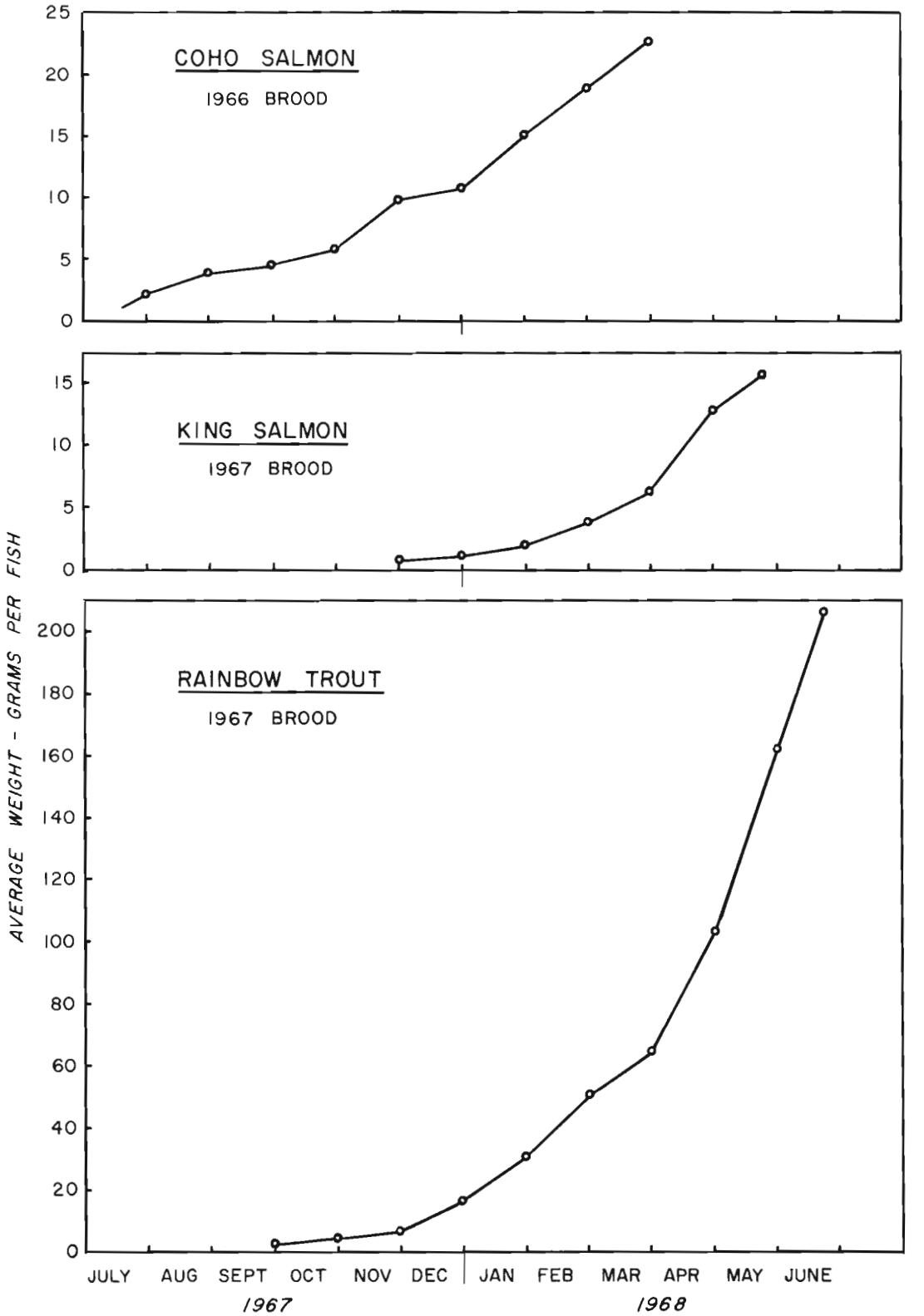

FIGURE 5. AVERAGE INDIVIDUAL WEIGHT OF COHO SALMON, KING SALMON AND RAINBOW TROUT REARED IN THE FT. RICHARDSON COOLING POND, BY MONTHLY PERIOD, 1967-1968.

pond during August, September and October. For record-keeping purposes, fish were kept on the hatchery records until October 16 when 110,800 fish (at an average of 101 per pound) which remained in the pond were officially transferred to the pond. At the end of the year, 110,700 fish at an average of 30 per pound remained.

Coho smolts which escaped capture by the seine during marking and remained in the pond began to die within about one week after the marking. Examination of dead and distressed fish revealed an extremely heavy infestation with Trichodina sp. King salmon in the same pond had a moderately heavy infestation, and rainbow in an adjoining section exhibited very few parasites. Trichodina infestations are easily controlled by formalin treatment, but use of formalin in the cooling pond is impractical. The most likely reason for the heavy infestation was that muck on the bottom of the pond was stirred up, thereby exposing the fish to the parasites. The muck was pumped from the pond, and the loss dropped quickly. Within a week, only occasional Trichodina could be found on the fish.

Rainbows exhibited symptoms of ulcer disease on May 3. A ten-day treatment with Terramycin at a level of 3 grams per 100 pounds of fish was administered, and symptoms of the disease disappeared.

Elmendorf Air Force Base Ponds

From an initial 5,000 rainbow fingerlings placed in the Elmendorf ponds on October 2, 1967, a total of 2,000 fish at an average size of five fish per pound were planted on May 25, 1968.

Ponds at Elmendorf were used to rear coho during June and July due to a need for additional pond space at the hatchery. On June 6, there were 255,100 coho of Oregon stock put into two of the ponds. On July 22, an estimated 15,000 fingerlings were planted in Six-Mile Lake. The remaining 225,800 coho fingerlings were moved to the Fort Richardson Cooling Pond.

On October 16, 1968, 5,400 rainbows of the 1968 brood, at an average size of 101 per pound, were transferred to the Elmendorf ponds. At the end of the calendar year, 5,300 at 20 per pound remained on hand.

LITERATURE CITED

Gretz, Gordon. 1963. Salmonoid Rearing and Migration Study: Fire Lake System. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1962-1963, Project F-5-R-4, 4:233-241.

_____. 1964. Salmonoid Rearing and Migration Study: Fire Lake System. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1963-1964, Project F-5-R-5, 5:189-204.

Jones, Darwin E. and Jerry Sexsmith. 1965. Salmonid Rearing and Migration Study: Fire Lake System. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1964-1965, Project F-5-R-6, 6:185-189.

Jones, Darwin E. 1966. Salmonid Rearing and Migration Study: Fire Lake System. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1965-1966, Project F-5-R-7, 7:131-144.

Wallis, Joe. 1967. Salmonoid Rearing and Migration Study: Fire Lake System and Fort Richardson Cooling Pond. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1966-1967, Project F-5-R-8, 8:129-152.

_____. 1968. Salmonid Rearing and Migration Study: Fire Lake System and Fort Richardson and Elmendorf Rearing Ponds. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1967-1968, Project F-5-R-9, 9:173-191.

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Inventory and cataloging study of fish populations by the use of a back-pack shocker.